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ABSTRACT

A research study conducted at Sam Houston State University (Texas) compared the final grades of students who chose the lecture method of instruction with the final grades of students who chose the self-paced method of instruction in introductory algebra classes. All students were required to take seven tests plus a comprehensive final examination. Dropout rates of these two groups were also compared. The lecture method of instruction produced more A's and fewer F's than the self-paced method. The self-paced class had more dropouts than the lecture class. Questions remaining concern the type of student who chooses the traditional over the self-paced class. (IAH)

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DISTRIBUTION OF COLLEGE GRADES IN INTRODUCTORY ALGEBRA USING THE LECTURE AND SELF-PACED METHODS

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DISTRIBUTION OF GRADES IN COLLEGIATE INTRODUCTORY ALGEBRA USING THE LECTURE AND SELF-PACED METHODS

Introduction

Educators agreed that students learn in different ways and at different rates. Curriculum specialists and teachers attempted to develop programs to meet individual needs of students. The self-paced instructional programs were created to help meet these needs. This study deals with the comparison of grades in two instructional methods of teaching Introductory Algebra to college students.

The lecture method was a traditional lecture course during which the instructor lectured on selected topics in the regularly scheduled class period. The student in the self-paced course was allowed to start, progress, and complete the course at any time within the semester. No lectures were given in the self-paced sections.

Hypothesis

The first hypothesis was that there is no significant difference between the final grade distribution of the lecture class and the self-paced classes. The second hypothesis was that there is no significant difference in the dropout rate between the lecture and self-paced classes.

Review of Literature

Two approaches that attracted attention in educational circles are the lecture method of instruction and the self-paced method of instruction. Numerous studies have compared the efficiency of alternate methods of instruction. Tyrone Gormely (1978) said that students taking Elementary Algebra as well as the lecture method of instruction and the self-paced method have common characteristics. The lecture method of instruction consists of having an instructor lecture on facts, assign homework problems, answer questions, and stimulate discussion. The advantages of the lecture method according to Gromley are as follows:

1. Most students are familiar with this method.
2. The method is efficient for the instructor in conveyance of facts and ideas.
3. Immediate feedback is available for students to ask questions.
4. Large number of students can be taught this way.
5. The instructor can add a human touch to this teaching method.

Gromley said the disadvantages are as follows:

1. The lecture reaches only some of the students.
2. Students must be good note takers and good listeners.
3. Lectures are not usually repeated.
4. Personality of the instructor may be a detriment to the student.

James R. Norton (1978) did a pilot study with student taking Intermediate Algebra at a community college. Each student team of four was allowed to set the pace for completing the course. Students were tested after completing each objective with the instructor lecturing when necessary. Norton described the traditional lecture method of teaching as placing heavy emphasis on the teacher as the dispenser and interpreter of knowledge using lecture, question and answer, and demonstration as the teaching tools. No students completed the course by the end of the semester, but students responded with a high degree of satisfaction resulting in working together with other people. Analysis of student progress indicated ninety percent mastery of the material.

Harvey Chew (1984) did a study with sample groups of students enrolled in a lecture/laboratory instructional format in remedial mathematics and students enrolled in the Personalized System of Instruction (PSI) at the University of Missouri--St. Louis. He found that the withdrawal rates in lecture methods of instruction were significantly lower than the PSI method of instruction and the proportion of students attaining content mastery was significantly higher in the lecture method of instruction than in the PSI method of instruction.

A study by Jane Marie Watson (1982) at an Australian university used and individualized system and a traditional lecture method. Results indicated that a better attitude and a higher pass rate occurred for the individualized instruction group while the lecture group had better long term retention of concepts.

There was no significant difference in the mathematics anxiety post-test scores of students in a self-paced class and the traditional lecture class in a study at Bucks County Community College in Newton, Pennsylvania. The study by Thomas Smith (1983) also showed no significant difference in the mathematics achievement scores of the lecture method and self-paced method of instruction. Also the results indicated that the better students scored higher in the self-paced class and the students with the least amount of prior knowledge of the subject made higher scores in the lecture approach.

A study by Vincent Schelack (1983) consisted of sixty-seven elementary education majors randomly assigned to a PSI class and a conventional lecture class. Results of the study showed that PSI students performed significantly higher than lecture students on the fifty item final exam.

Richard Thompson and Jan S. McCoy (1979) run a student-paced Personalized System of Instruction (PSI). The system averages three thousand students enrolled in Introductory, Intermediate, and College Algebra classes. Instructor-paced programs are programs which force students to complete certain material on a fixed schedule. The study showed that students in the student-paced method had low completion rates. Results indicated that instructor pacing definitely superior to student-pacing in College Algebra. In Introductory Algebra, instructor-pacing was unsatisfactory because of the worst completion rates and lowest final exam scores ever experienced in the course.

Methods

This research study was conducted using college students at Sam Houston State University in Huntsville, Texas, enrolled in Math 132 (Introductory Algebra) in the school year 1984-1985. Students were free to register for the lecture method of instruction or the self-paced method of instruction. No attempt was made to manipulate or control the instructional setting.

The lecture class was taught under normal conditions by an instructor previously assigned to the course. An instructor was assigned to oversee the lab in which tests were given to the self-paced students. Students enrolled in the self-paced classes did not meet for lecture. The student reported to the tutorial lab once a week and were assisted by tutors (graduate assistants). All students were required to take seven tests plus a comprehensive final exam. The content in all sections was equivalent. The grades were given on the traditional basis of 90-100 (A), 80-89 (B), etc.

Results of the Study

The research study compared final grades of the lecture method of instruction with final grades in the self-paced method of instruction in Introductory Algebra classes. Table 1 shows that there was a significant difference in the expected and observed final grades between the lecture and self-paced classes. The chi square value of 18.19 is significant at the .01 level of significance.

There were significantly less A's and significantly more F's in the self-paced classes when compared to the total. Proportionally there are about fifty percent more F's and about one-third the total of A's in the self-paced class.

Table 2 indicated that are proportionally more drop outs in the self-paced classes. The chi square value of 5.44 is significant at the .05 level.

Conclusions

The research did reject both hypotheses. The lecture method of instruction had more A's and less F's than the self-paced method of instruction. The self-paced class had more drop outs than the lecture class. Questions remain such as: 1) Do the good students take the traditional curriculum? 2) Are the weaker students searching for a different way of approaching the class? An educational truism states that the slower the student intellectually, the more structure is required in the class. This may be the situation in this study.

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Table 1. Observed Grades with Chi Square

OBSERVED	A	B	C	D	F	TOTALS
Lecture	38	86	98	87	215	524
Self-Paced	5	19	28	26	107	185
(Proportional)	(14)	(54)	(79)	(74)	(303)	(524)
TOTALS	43	105	126	113	322	709
CHI SQUARE = 18.19			P < .01			df = 4

Table 2. Values for Completed and Dropping Out

OBSERVED	COMPLETED	DROPS	TOTALS
Lecture	545	155	700
Self-Paced	194	80	274
Proportional (Self- Paced)	(494)	(204)	(700)
CHI SQUARE = 5.44		P < .05	df = 1